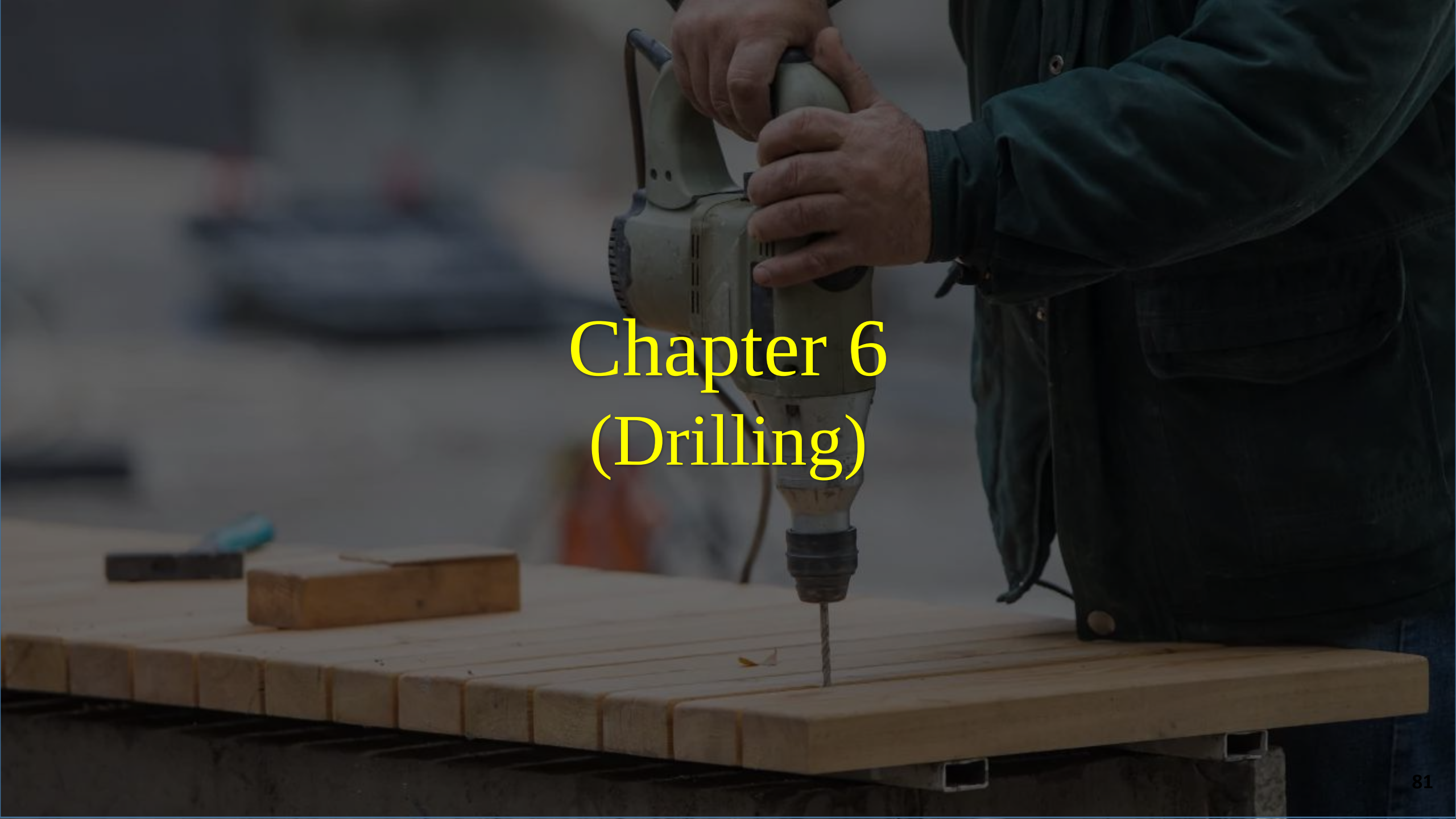
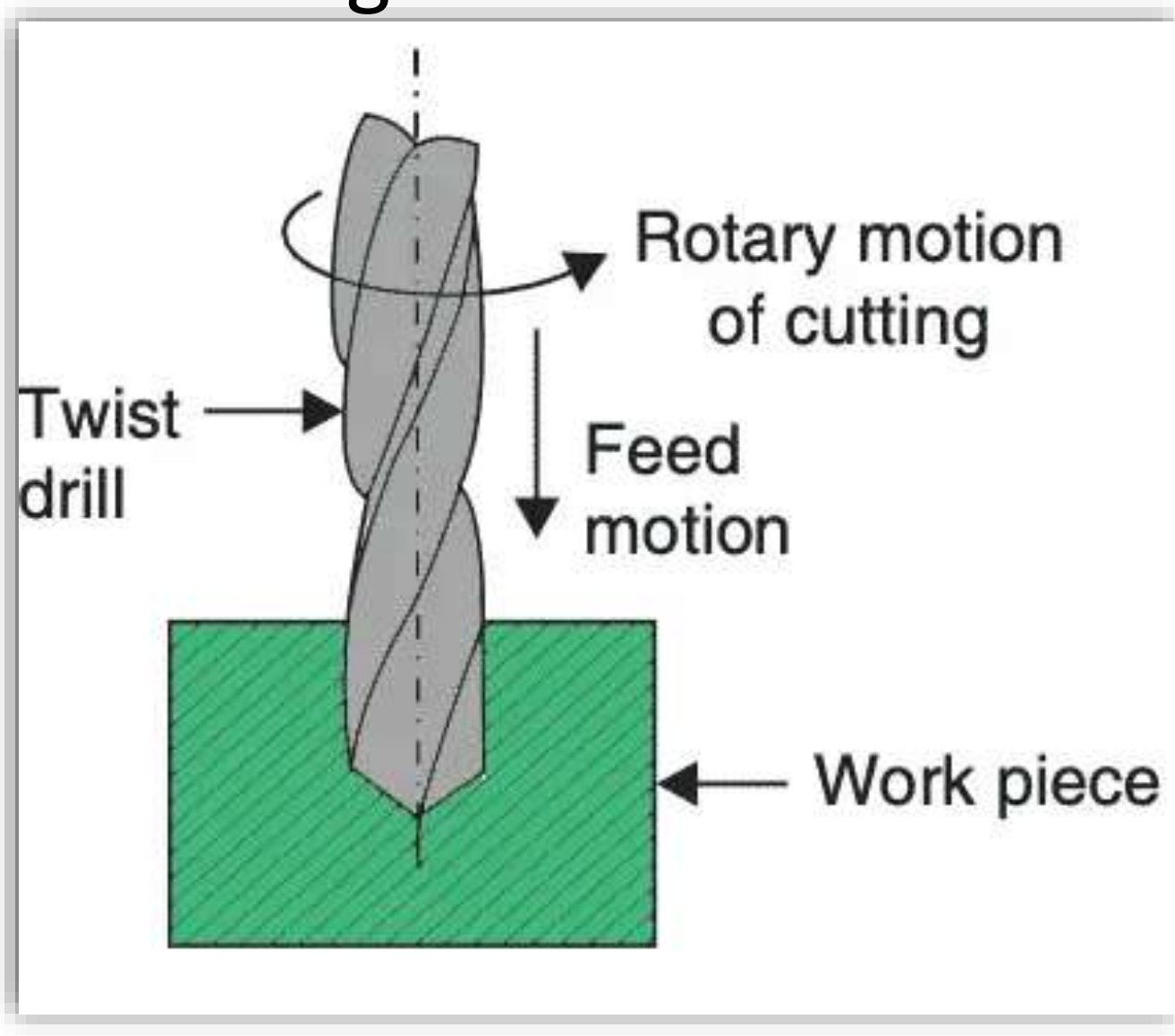


Chapter 6
(Drilling)

Principle of drilling

Drilling is a machining process that involves the use of a rotating cutting tool called a drill bit to create a round hole in a solid workpiece. The basic principle of drilling is based on the rotation of the drill bit, which penetrates the material of the workpiece while being fed into the surface.



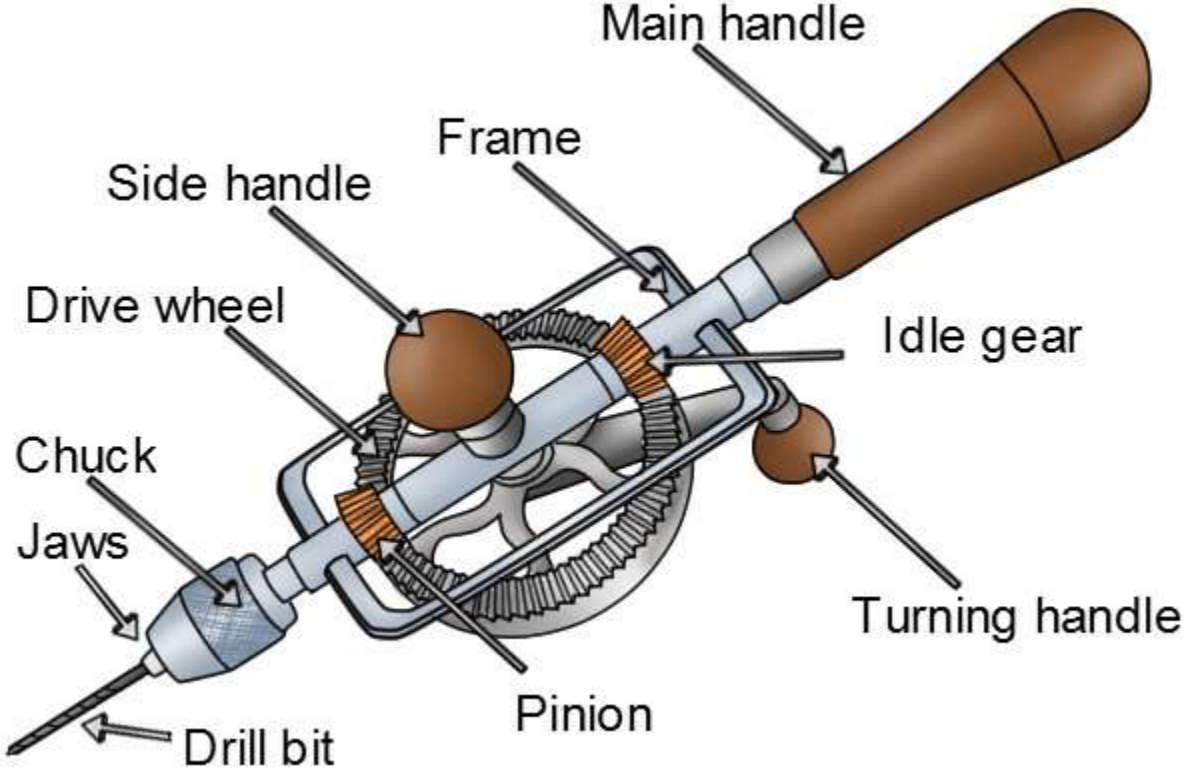
Classification of drilling machines and their description

Portable Drilling Machines:

Description: These are hand-held machines that are used for drilling holes in various materials, especially when mobility is required. They are lightweight and can be operated by a single person.

Applications: Used in construction sites, maintenance, and repair work.

Example: Hand drills, cordless drills.



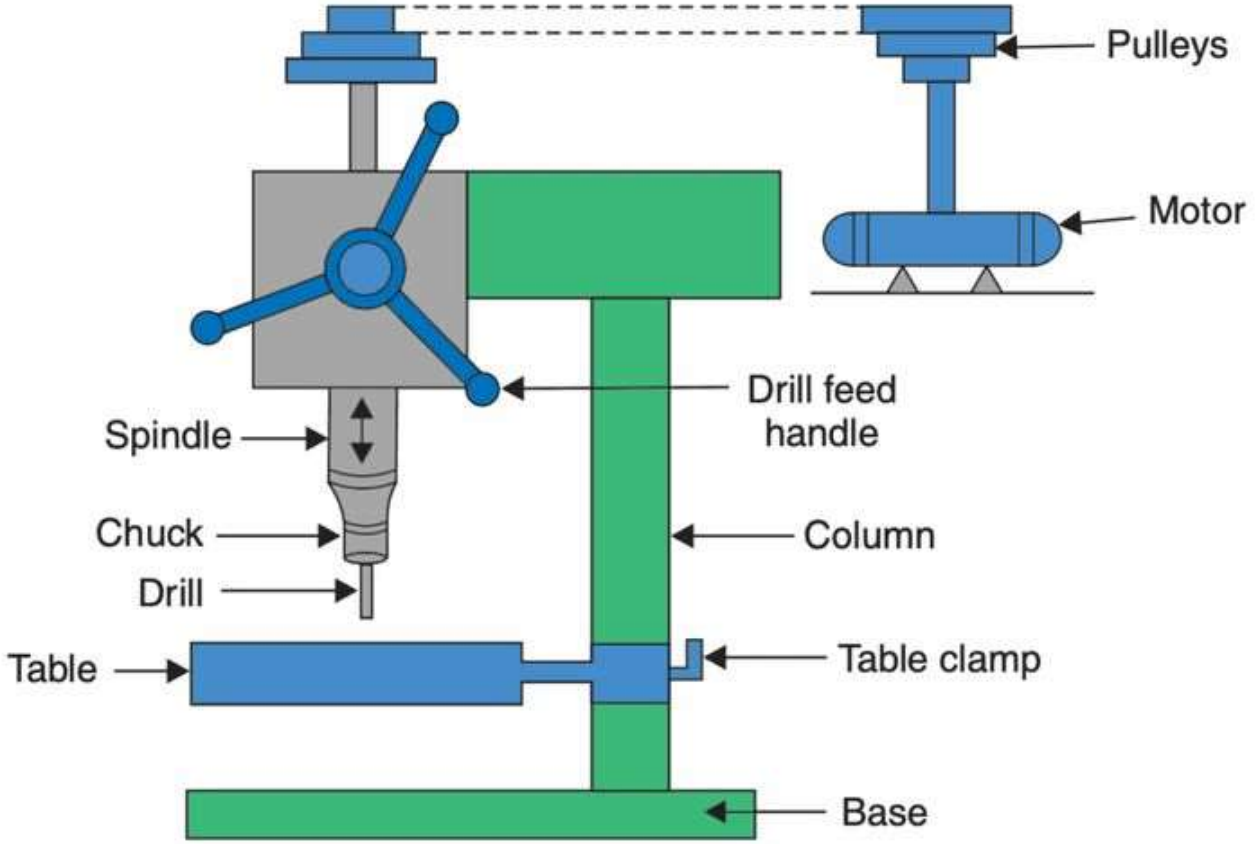
Classification of drilling machines and their description

Bench Drilling Machines:

Description: These machines are mounted on a bench or table and are typically used for drilling smaller holes in lighter work pieces. They are more stable than portable drills and are ideal for precision work.

Applications: Used for drilling small and medium-sized holes in metals, plastics, wood, etc.

Example: Bench drills, pillar drills.



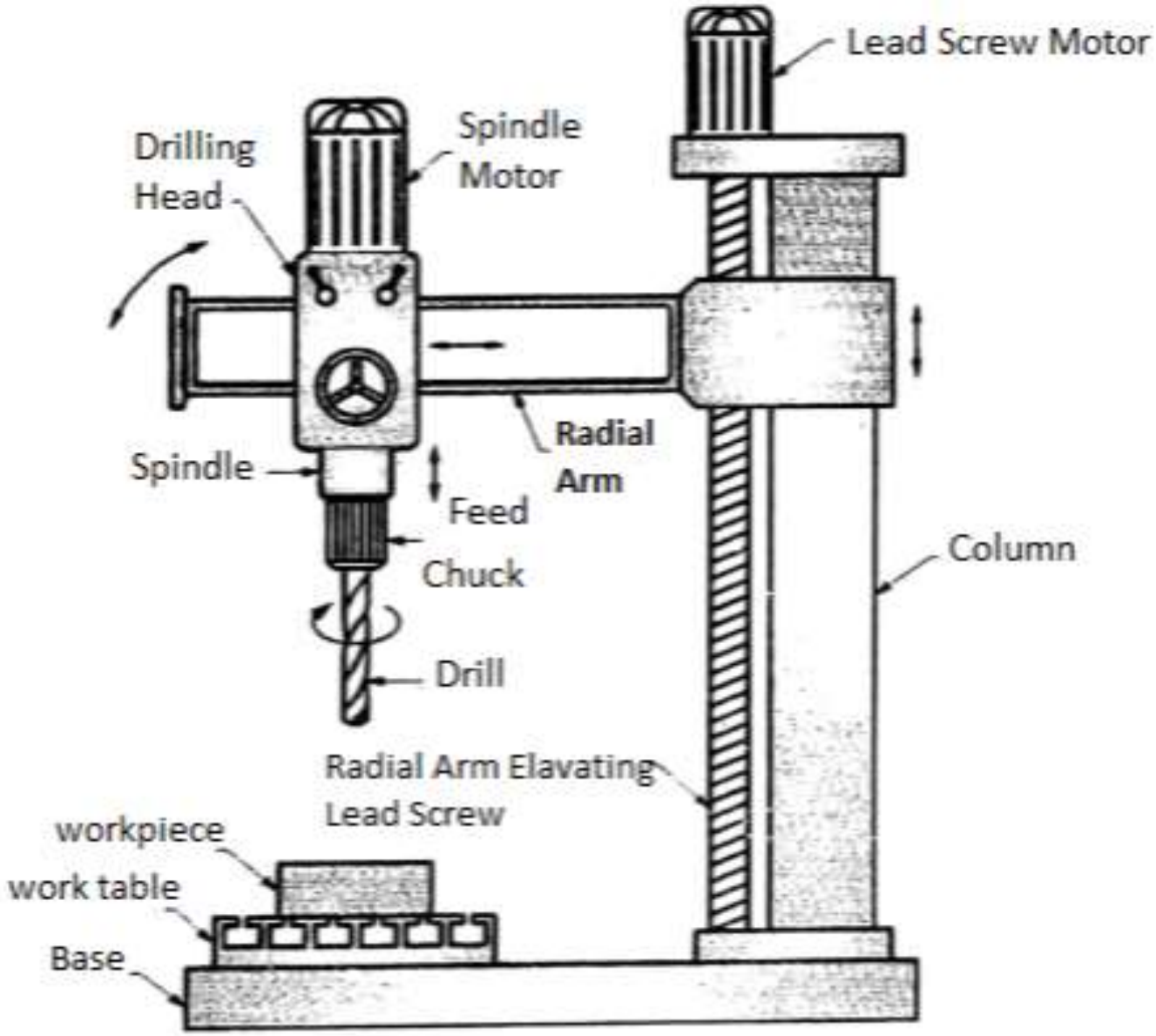
Classification of drilling machines and their description

Radial Drilling Machines:

Description: These machines are mounted on a radial arm, allowing the drilling head to be moved in various directions. This flexibility makes them suitable for drilling larger work pieces, as the arm can be adjusted for different distances.

Applications: Used for drilling large and heavy parts, such as engine blocks, frames, etc.

Example: Radial drilling machine, radial arm drill press.



Radial Drilling Machine

Classification of drilling machines and their description

Upright Drilling Machines (Vertical Drilling Machines):

Description: These machines have a vertical spindle and are used for drilling holes in vertical positions. They are highly accurate and versatile, often used in production environments.

Applications: Suitable for precise, small, and medium-sized hole drilling in a variety of materials.

Example: Vertical drill press.

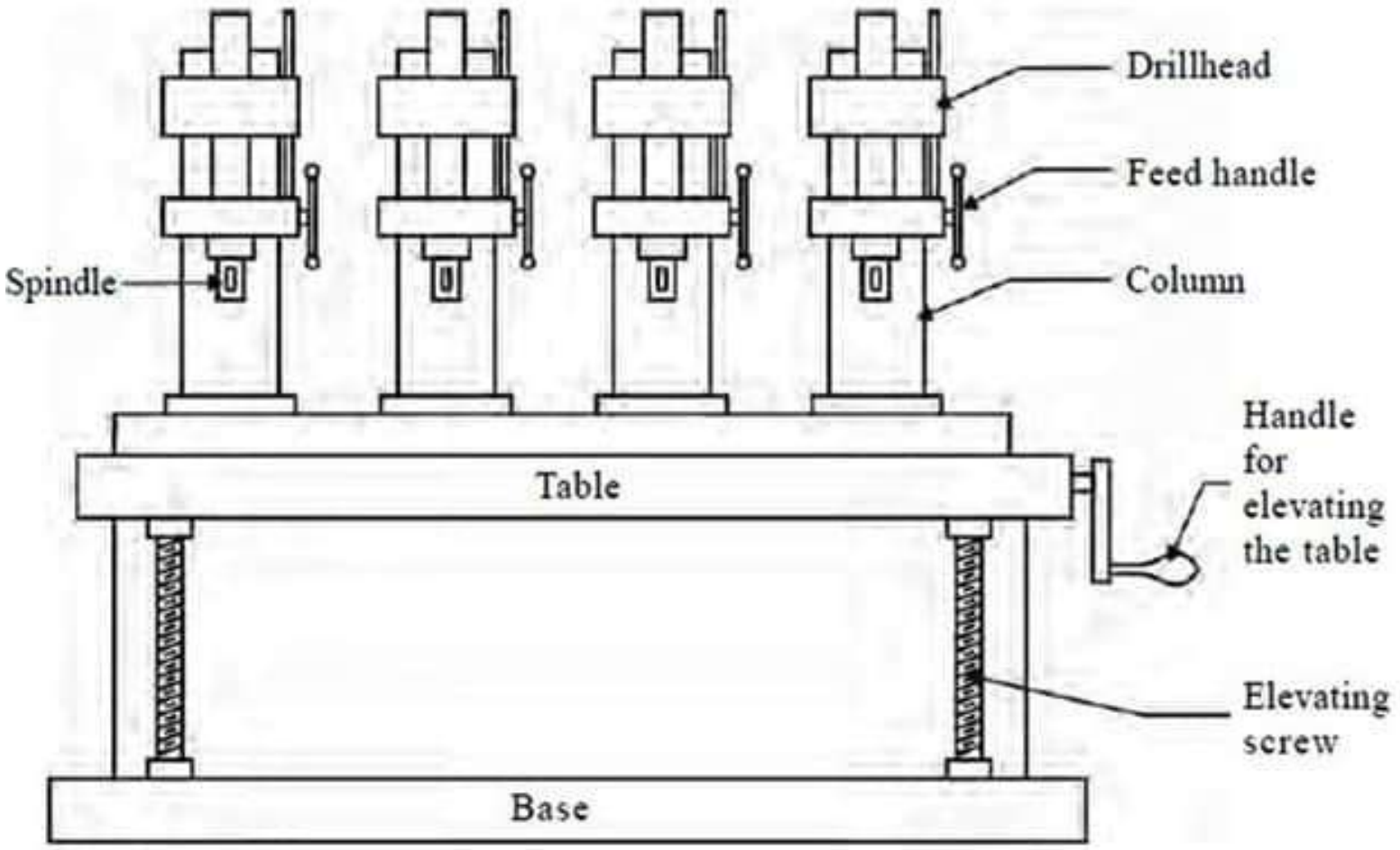
Classification of drilling machines and their description

Gang Drilling Machines:

Description: These machines are equipped with multiple spindles that can perform several drilling operations simultaneously. This increases the productivity of the drilling process.

Applications: Ideal for mass production or when multiple holes need to be drilled in one cycle.

Example: Gang drilling setup in a production line.



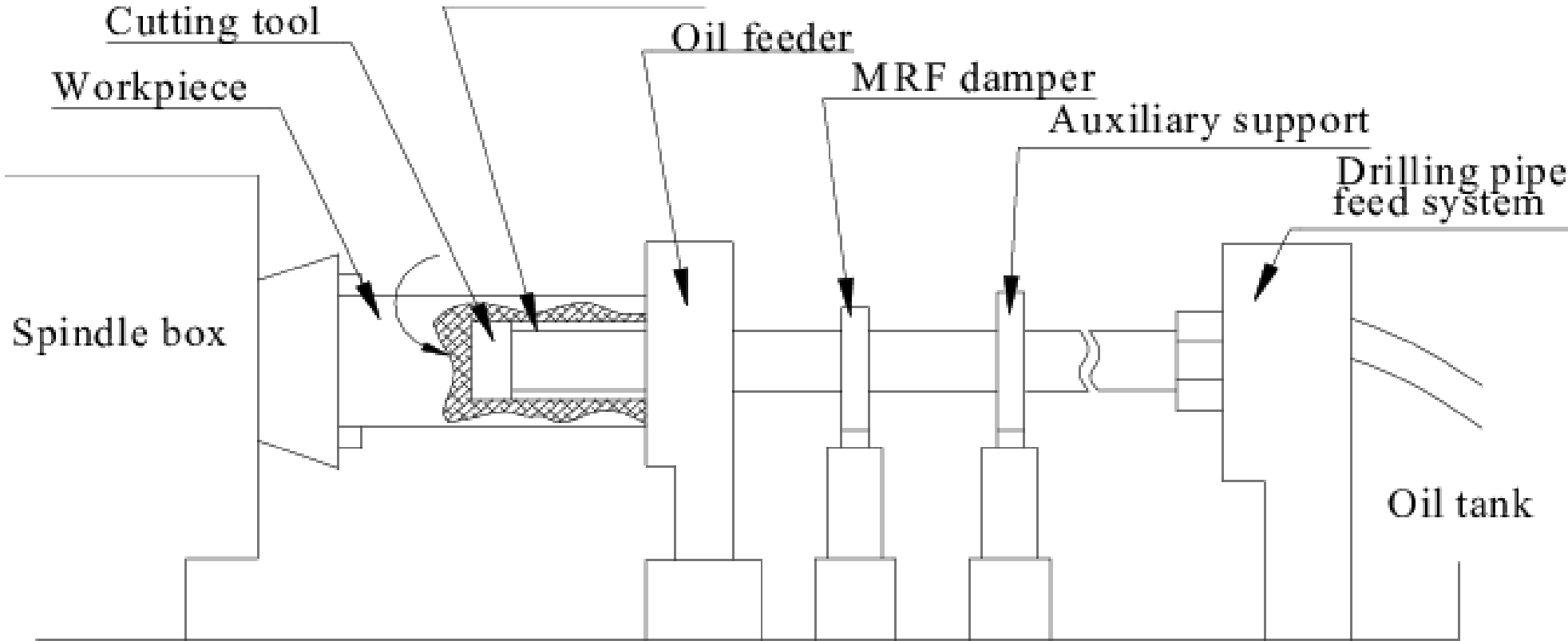
Classification of drilling machines and their description

Deep Hole Drilling Machines:

Description: These specialized machines are used to drill deep holes with high accuracy, often using high-pressure coolant systems to ensure proper chip removal and cooling.

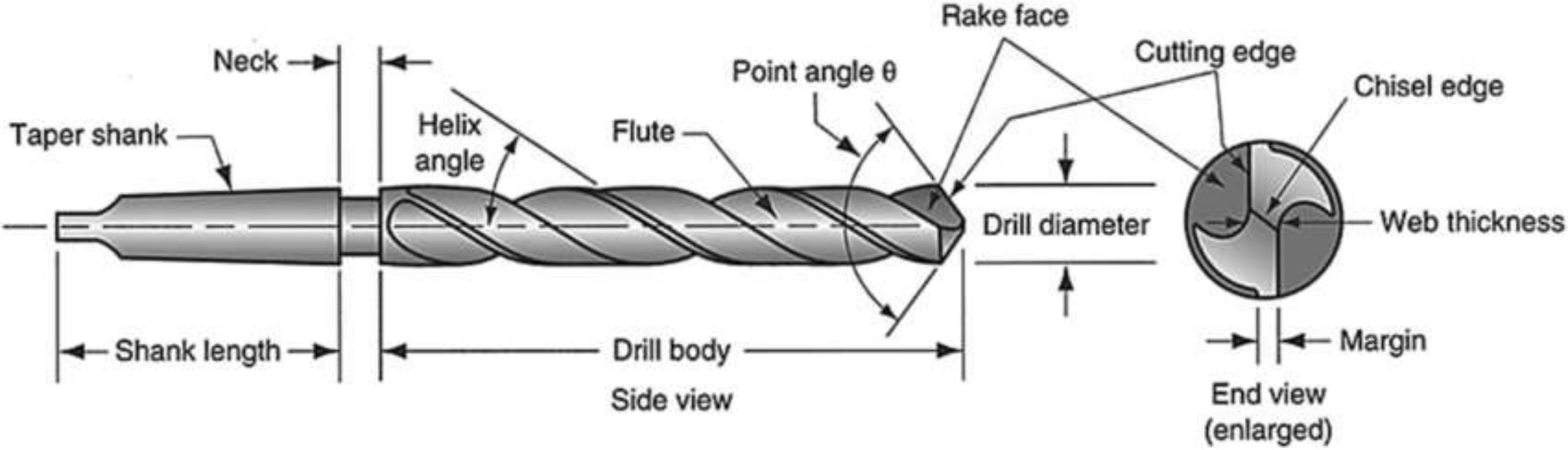
Applications: Used for drilling deep, narrow holes in materials such as metals or hard alloys, typically in the aerospace and automotive industries.

Example: Gun drilling machines.



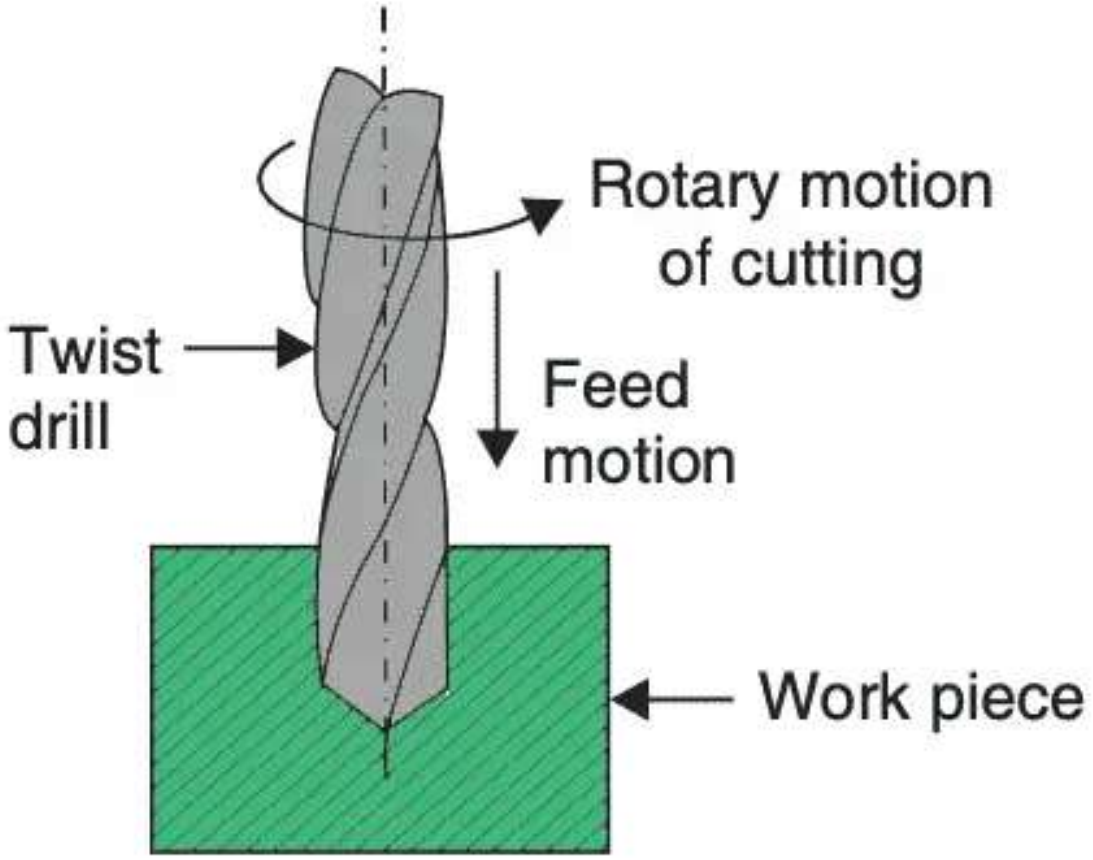
Twist drill and its nomenclature

Twist Drill: A new hole is produced in the solid workpiece. A cutting tool known as twist drill is given a rotary and fee motion to make a hole.



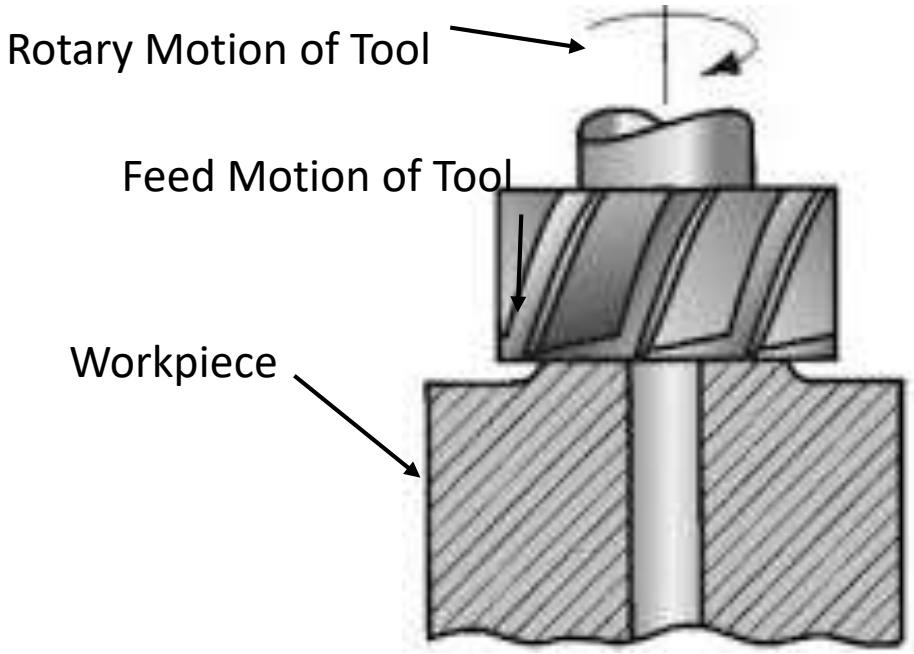
Various operation performed on drilling machine

Drilling: A new hole is produced in the solid workpiece. A cutting tool known as twist drill is given a rotary and feed motion to make a hole.



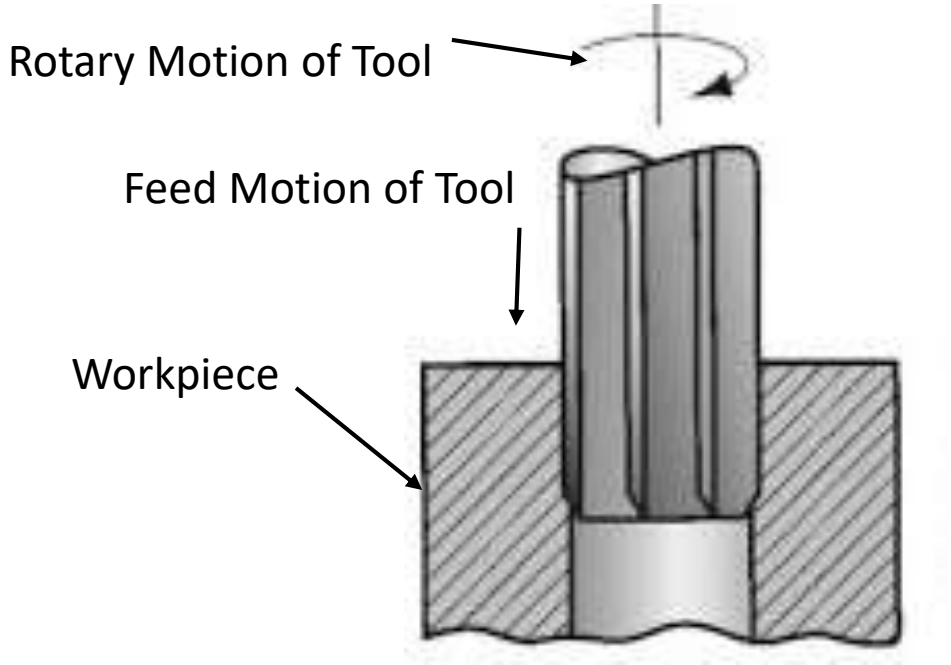
Various operation performed on drilling machine

Spot Facing: Any burr material is removed using a mill cutter from the top of workpiece to sit a bolt head properly.



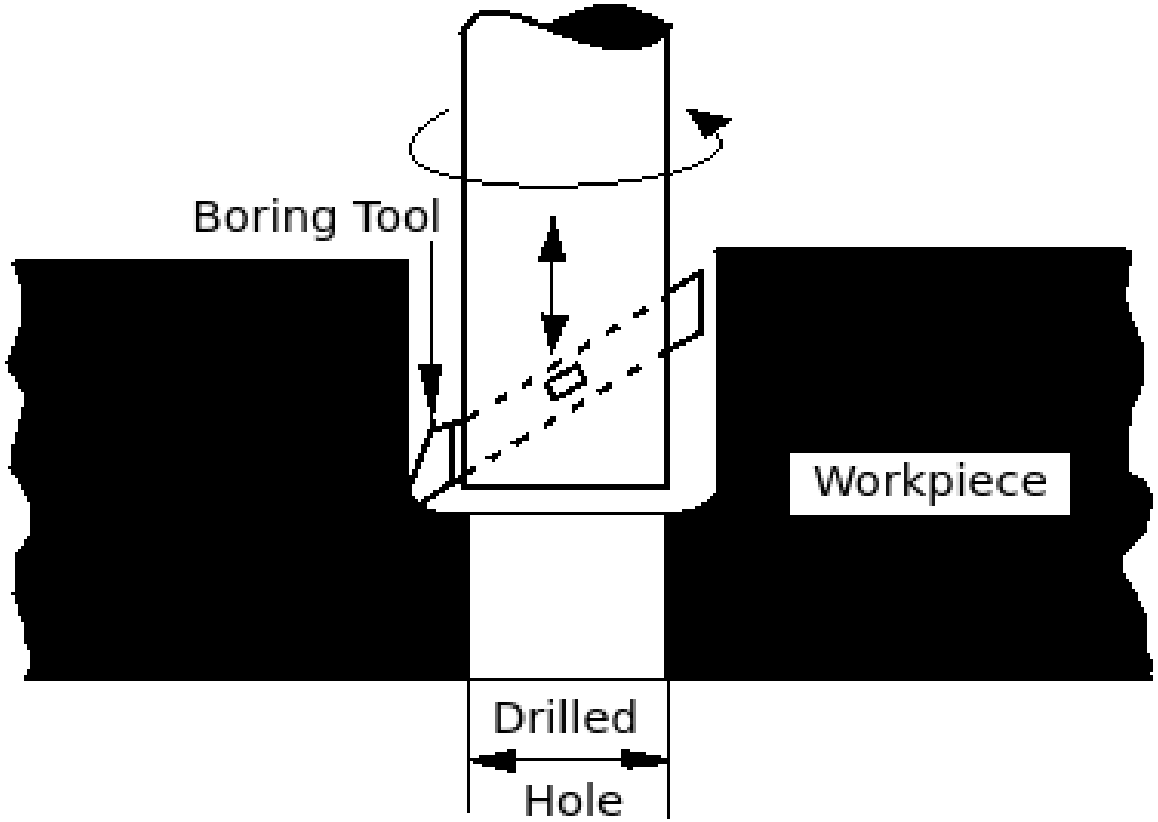
Various operation performed on drilling machine

Reaming: A new produced is finished using a reamer tool.



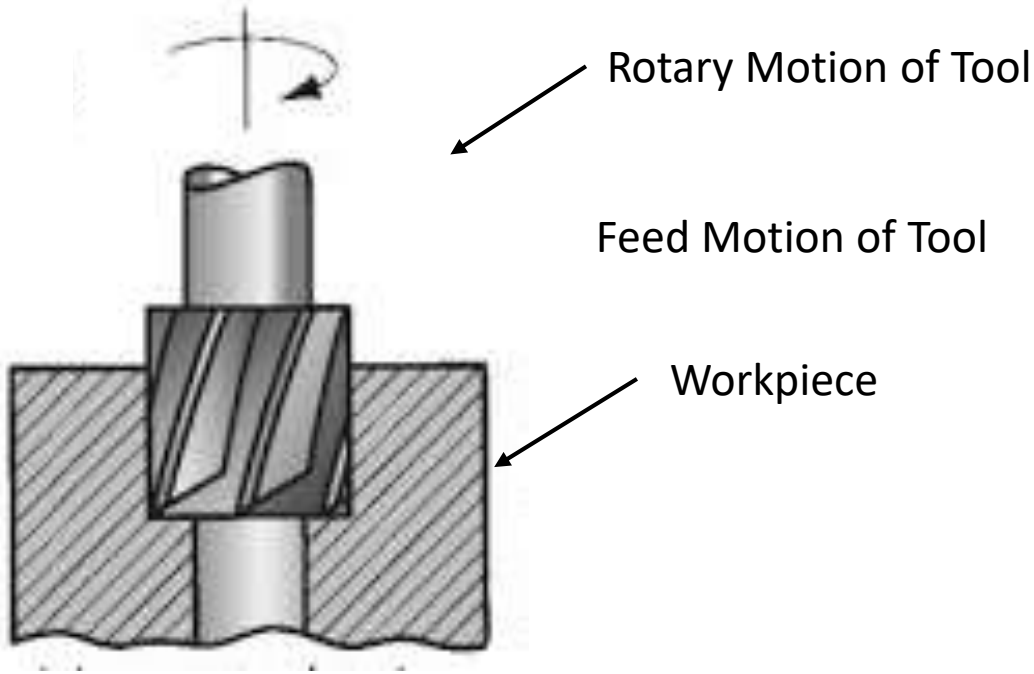
Various operation performed on drilling machine

Boring: A drilled hole is enlarged to a required size using boring tool up to full depth.



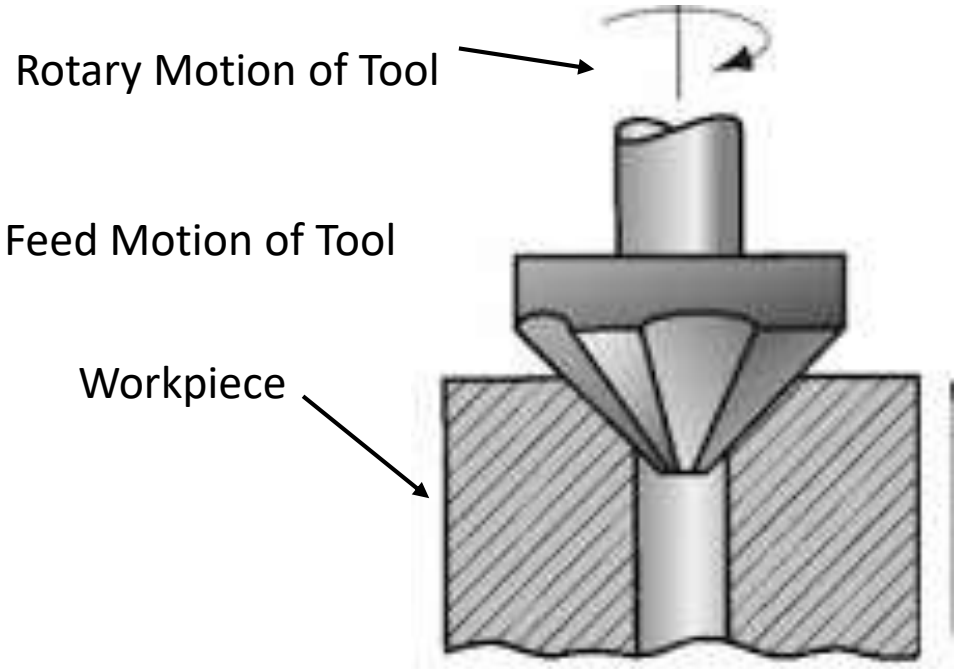
Various operation performed on drilling machine

Counter Boring: A drilled hole is enlarged to a required size using boring tool up to small depth.



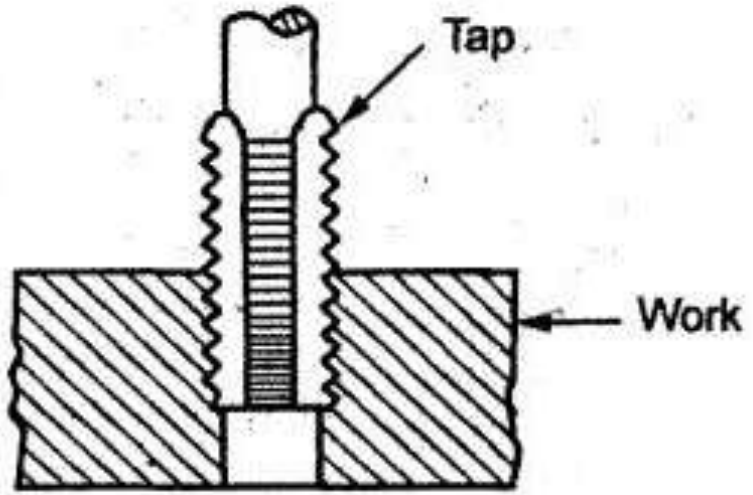
Various operation performed on drilling machine

Counter Sinking: A drilled hole is tapered at top to fit a conical bolt using counter sinking tool.



Various operation performed on drilling machine

Tapping: It is the process of cutting the internal thread. The tool used to cut the internal thread is called tap set.



Drill Holding Devices

Drill holding devices are essential tools that securely hold and guide drill bits during machining or drilling operations, ensuring accuracy, safety, and efficiency. Below are common types of drill holding devices, each accompanied by a brief description and an image for better understanding:

Drill Holding Devices

1. Drill Chucks

Keyed Chuck: Utilizes a key to tighten or loosen the jaws that hold the drill bit

Keyless Chuck: Allows for hand tightening, facilitating quicker bit changes.

Drill Holding Devices

2. Taper Holders (Morse Taper)

Designed for taper shank drills, these holders fit directly into the spindle of a drill press or lathe and are self-locking due to the taper design.

Drill Holding Devices

3. Drill Press Vises

While not for holding the drill itself, drill press vises securely hold the workpiece, ensuring stability and precision during drilling.

Type of Reamers

Reamers are precision cutting tools used to enlarge or finish existing holes to an exact size and smooth finish. They come in various types depending on the application, shape, and method of use.